

# Introduction

Colloids are found to favorably sorbed at gas-liquid interfaces (Fig. 1) under certain conditions in subsurface vadose zones and ocean surface. Thus, quantifying colloidal surface excesses is important for understanding and predicting partitioning, transport and transformations of colloids, and other organic and metal species complexed onto colloids in many natural environments. Although surface excesses of solutes can be determined by measuring changes in surface tension combining with the Gibbs adsorption equation (Eq.1), no methods for quantifying colloid surface excesses were available prior to this EMSP project. In this study we developed a bubble column method for measuring partition coefficients of colloids at air-water interfaces. The first measured partition coefficients of kaolinite and humic colloids at the air-water interfaces are reported. The bubble column method can also be used to identify surface exclusion of colloids at the air-water interface. This method permits quantification of surface activities of a wide range of inorganic, organic, and microbial colloids, as well as molecular species complexed onto colloids.

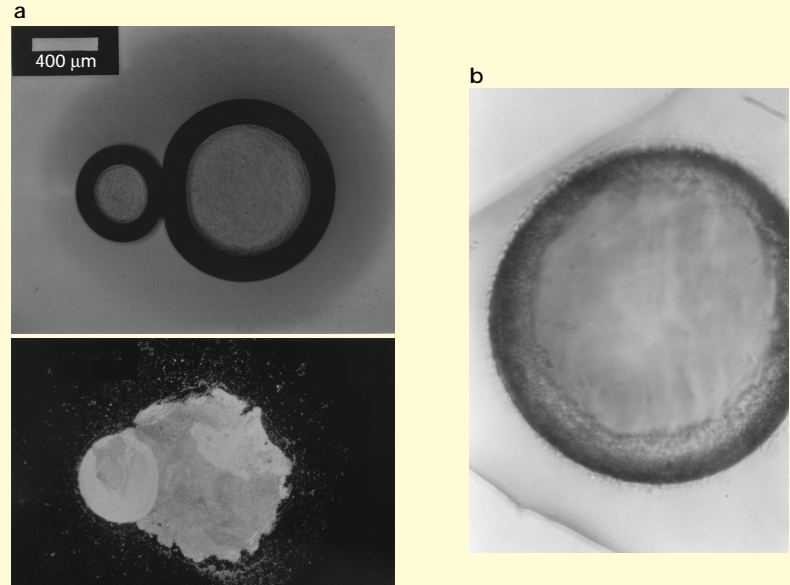


Fig. 1. Sorption of kaolinite clay (a) and bacteria (b) on the surfaces of air-bubbles.

The Gibbs adsorption equation

$$\Gamma = - \frac{C}{RT} \frac{d\gamma}{dC} \quad (1)$$

is useful for molecular species by  
Measuring surface tension changes,  
*but not for colloids*